



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,872	06/24/2003	Won-Bong Choi	030681-521	1325
21839 7590 07/13/2007 BUCHANAN, INGERSOLL & ROONEY PC POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404			EXAMINER YUAN, DAH WEI D	
			ART UNIT 1745	PAPER NUMBER
			MAIL DATE 07/13/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/601,872

Applicant(s)

CHOI ET AL.

Examiner

Dah-Wei D. Yuan

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 13-30 is/are pending in the application.
- 4a) Of the above claim(s) 17-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 13-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

**CARBON NANOTUBES FOR FUEL CELLS, METHOD FOR MANUFACTURING THE
SAME, AND FUEL CELL USING THE SAME**

Examiner: Yuan

S.N. 10/601,872

Art Unit: 1745

July 5, 2007

Detailed Action

1. The Applicant's amendment filed on April 30, 2007 was received. The specification was amended.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on January 30, 2007.

Claim Rejections - 35 USC § 102/103

3. Claim rejections under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Dodelet et al. (US 6,887,451 B2) on claims 1-4,13-16 are maintained. The rejection is repeated below for convenience.

With respect to claims 1,3, Dodelet et al. teach carbon nanotubes which are grown over a carbon paper carrying nanosized catalyst. See Column 2, Line 34 to Column 3, Line 17. As disclosed in the instant specification, the use of hydrogen gas can convert metallic catalyst particles in oxidized form into reduced form, thereby increasing the activity of the catalyst particles and lead to the growth of branched carbon nanotubes. See page 6, lines 8-10. Dodelet et al. similarly teach the use of hydrogen and acetylene in the gaseous mixture to fabricate carbon nanotubes. Therefore, the formation of some branched carbon nanotubes in the final MWCNTs would have been essentially certain.

Furthermore, Dodelet does not specifically disclose the loading of the catalyst on the nanotubes. However, it is the position of the examiner that such properties of said material are inherent, given that the nanotubes disclosed by Dodelet et al. and the present application having similar chemistry and preparation procedure. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. In re Robertson, 49 USPQ2d 1949 (1999). Alternatively, it would have been obvious to one of ordinary skill in the art to adjust the catalytic concentrations of the nitrate salts ranging from 0.15 to 1.0 M in order to provide desirable concentration of the nano-sized catalyst between 0.3-5 mg/cm².

In addition, it is the position of the examiner that disclosure provides no evidence of criticality with regard to the concentration of the catalyst particles.

With respect to claim 2, Dodelet et al. teach the use of catalysts including Fe, Co and Ni, which can serve as catalysts for carbon nanotube growth and fuel cells. See Column 3, Lines 23-29; Column 4, Lines 31-36.

With respect to claim 4, it is the position of the examiner that such properties of said material are inherent, given that the nanotubes disclosed by Dodelet et al. and the present application are prepared by the same procedure, i.e., chemical vapor deposition.

With respect to claims 13-16, Dodelet et al. teach the use of nanotubes as the electrodes for fuel cells. See Column 1, Lines 9-17.

Response to Arguments

4. Applicant's arguments filed on April 30, 2007 have been fully considered but they are not persuasive.

Applicant's principal arguments are

Applicants discuss in their Declaration that the branched carbon nanotubes are formed by introducing hydrogen gas into the reaction chamber for a short period of time during synthesis.

In response to Applicant's arguments, please consider the following comments.

In the instant specification, Applicants first disclose the formation of nanotubes without the addition of hydrogen gas in the reactor. See Examples 1 and 2. In a separate example, the introduction of hydrogen into the reactor for 20 minutes results in the formation of branched carbon nanotubes. However, there is no evidence to indicate that prolonged exposure to the hydrogen, as taught by Dodelet, would not lead to the formation of branched carbon nanotubes. Applicants are encouraged to submit additional information regarding the criticality of the length of time in the production of the so-called "branched nanotubes".

It is also noted that the alleged "branched nanotubes"(20) appears to reattach to the "main trunk portion" of the nanotubes in the revised Figure 4. This observation is inconsistent with the definition, i.e., "splintered portion", used to describe the term and the schematics shown in Figure 6(d). Additional visual evidence would be helpful to support and substantiate the prevalent formation of branched carbon nanotubes by using the claimed synthesis technique.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).

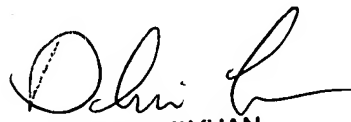
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

Art Unit: 1745

applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan
July 5, 2007



DAH-WEI YUAN
PRIMARY EXAMINER